

The American S. S. *Eldridge*, Capt. F. W. Brooks, Observer R. B. Devenpeck, Taku, China, toward Seattle, was involved on the 8th to 11th in a cyclone which, on the 7th, was leaving the Japanese coast. On the 11th the wind, which was of irregular strength, attained its maximum observed force, 11 from the west-northwest, in  $49^{\circ} 55' N.$ ,  $178^{\circ} 15' W.$  From the 11th to the 13th the American S. S. *President Jefferson*, Capt. F. R. Nichols, Observer C. H. Moen, Orient toward Seattle, encountered rough weather, the highest wind force of which, SSE. 10, occurred in  $52^{\circ} N.$ ,  $145^{\circ} W.$ , on the 11th. The Japanese S. S. *Fukuyo Maru*, Capt. A. Tokagi, Observer S. Terasaki, experienced a whole gale from the west-southwest in  $39^{\circ} 41' N.$ ,  $155^{\circ} 34' W.$ , on the 13th, lowest pressure 29.48. The lowest pressure observed during the period, 7th to 14th, was 28.57 inches, read on board the British S. S. *Harold Dollar*, on the 13th, in latitude  $46^{\circ} 30' N.$ , longitude  $161^{\circ} W.$ , during a strong north to northeast gale.

On the 16th the Aleutian low reached its maximum activity, and no gales were that day reported from northern waters. On the 17th the great storm center began to deepen and gales again set in to the southward of the Aleutians in both east and west longitudes. On the 18th pressure dropped below 29.00 inches at Dutch Harbor, and in latitude  $47^{\circ} 23' N.$ , longitude  $172^{\circ} 13' E.$ , the Japanese S. S. *Africa Maru* fell in with fresh to strong gales which culminated in a force of 11 from the west-by-north, lowest pressure 28.66 inches.

On both the 20th and 25th storms entered the ocean over northern Japan, occasioning gales over a considerable area to the eastward. Through the latter of these storms

particularly, moderate to strong gales occurred from the 26th to the 28th over a stretch of sea embraced between the 35th and 45th parallels, 150th and 170th meridians of east longitude. On the 27th to the 30th the gale area extended between the 35th parallel and the Aleutians, as far eastward as  $170^{\circ} W.$

Gales also occurred off the American coast to the northward of California on the 22d to the 24th, owing to the cyclone which, appearing to the westward of British Columbia on the 22d, moved inland on the 23d and 24th. But the highest wind velocities, force 10 from a north-westerly direction, noted over the main traversed routes during the last decade of November occurred on the 28th near  $45^{\circ} N.$ , between  $160^{\circ}$  and  $170^{\circ} E.$ , and were reported by the American S. S. *Dewey* and the British S. S. *Empress of Canada*.

At the close of the month an extensive anticyclone was moving eastward from Mongolia, and pressure was high in midocean below the 40th parallel, and along the central portion of the Hawaii-San Francisco route. A cyclone was central over the Kuriles, and another of considerable intensity lay at 8 p. m. of the 30th over the Gulf of Alaska.

Fog seems to have diminished considerably in frequency this month as compared with October. This decrease was especially noticeable in east longitudes, where fog was reported as having occurred on only five days over the area embraced between the 40th and 50th parallels and the 180th meridian and the Japanese coast. Some fog was reported in the eastern part of the Gulf of Alaska; near Puget Sound and Vancouver on six days; and outside San Francisco Harbor on four days.

#### FOUR TYPHOONS IN THE FAR EAST DURING OCTOBER, 1923.

By REV. JOSÉ CORONAS, S. J.

[Weather Bureau, Manila, P. I.]

Four typhoons were shown by our weather maps of the Far East during the first half of the month of October, although only one of them influenced the weather in the Philippines, the other three being rather typhoons of the Ladrone or Caroline Islands. There was not a single typhoon noticed after the 12th.

The first typhoon appeared on the 2d to the south of Guam in about  $10^{\circ}$  latitude N. and  $145^{\circ}$  longitude E. It moved northwestward between Guam and Yap on the 3d; it inclined to NNW. on the 4th, and it probably filled up on the 7th not far from  $134^{\circ}$  or  $135^{\circ}$  longitude E.,  $23^{\circ}$  or  $24^{\circ}$  latitude N.

The second typhoon was simultaneous with the preceding one and was quite clearly shown by the observations of Guam on the 3d and 4th. We have no means to decide whether it was a well-developed typhoon or only a depression. Its center was about 150 miles to the NNE. of Guam on the 3d, moving NW. It probably recurved northeastward on the 4th near  $144^{\circ}$  longitude E. and  $18^{\circ}$  latitude N. It was impossible to follow it after the 5th.

The third and most important typhoon of the month was shown by our weather maps on the 5th to the E. of central Luzon in about  $130^{\circ}$  longitude E. and near  $16^{\circ}$  latitude N. After moving slowly W. by N. for about two days, it took on the 7th a decided northerly direction, thus dispersing the danger for the Philippines; the center was then about 250 miles east of Luzon not far from  $126^{\circ}$  longitude E. The typhoon moved NNE. on the 8th and NE. on the 9th and the following days. When the center was passing close to the Loochoos on

the 9th, our weather maps showed that it was a very well developed and intense typhoon. The center passed close to the southeastern coast of Japan on the 11th.

The approximate positions of the center at 6 a. m. of 8th to 11th are as follows:

October 8th, 6 a. m.  $20^{\circ} 30'$  latitude N.,  $128^{\circ} 20'$  longitude E.  
 October 9th, 6 a. m.  $24^{\circ} 35'$  latitude N.,  $127^{\circ} 35'$  longitude E.  
 October 10th, 6 a. m.  $28^{\circ} 25'$  latitude N.,  $132^{\circ} 15'$  longitude E.  
 October 11th, 6 a. m.  $33^{\circ} 50'$  latitude N.,  $139^{\circ} 45'$  longitude E.

The fourth typhoon was altogether simultaneous with the one of the Loochoos just mentioned. It appeared on the 5th and 6th to the NE. of Guam in about  $17^{\circ}$  latitude N. and  $150^{\circ}$  longitude E. It moved NNW. and recurved northeastward on the 9th. At 6 a. m. of the 9th the center was situated about 200 miles east of the Bonins.

#### A DESTRUCTIVE TYPHOON IN THE PHILIPPINES, NOVEMBER 16 TO 18, 1923.

By REV. JOSÉ CORONAS, S. J.

[Weather Bureau, Manila, P. I.]

This typhoon was clearly shown by our weather map of the 15th, 6 a. m., about 200 or 250 miles to the east of the southern part of Samar near  $139^{\circ}$  longitude E. and  $11^{\circ}$  latitude N. It moved at the beginning W. by N., reaching the central part of Samar in the morning of the 16th. The center traversed Samar in a westerly direction, passing close to our stations of Borongan, Catbalogan, and Calbayog, and causing great damage

throughout that Province. At the time of writing this article, 10 days after the storm struck Samar, telegraphic communication has not been restored as yet to the eastern part of the island, where the lowest barometric minimum is supposed to have been recorded and the greatest damage done by the rains, winds, and sea waves. The barometric minima recorded at Catbalogan and Calbayog were, respectively: 714.85 mm. (28.14 inches) at 6:46 p. m. of the 16th, and 720.13 mm. (28.35 inches) at 8:33 p. m. of the 16th. The position of the center at 6 p. m. of the 16th was  $124^{\circ} 55'$  longitude E. and  $11^{\circ} 50'$  latitude N.

After crossing the island of Samar the typhoon began to incline to NW. and NNW., the center being situated at 2 p. m. of the 17th to the NE. of Romblon in about  $122^{\circ} 30'$  longitude E. and  $13^{\circ} 20'$  latitude N. At 6 a. m. of the 18th the center passed about 50 miles to the east of Manila along the eastern coast of Luzon, moving N. by W. or NNW. Then, in the afternoon of the same day, the typhoon inclined again westward and

entered the China Sea during the night of the 18th to 19th not far from  $16^{\circ}$  latitude N.

The storm had lost much of its intensity after it traversed Samar, it being only a shallow depression when it crossed Luzon to the north of Manila. Yet considerable damage was done in many of the Provinces near the center by heavy rains and consequent floods. In Manila the total daily rainfall for the 18th and 19th was 278.5 mm. (10.96 inches) and 243.7 mm. (9.60 inches), respectively, and the flood, which was the worst of this year, caused the water to be  $1\frac{1}{2}$  meters high in some of the lower portions of the city.

Once in the China Sea the depression or typhoon, after moving for about one day almost due west, remained almost stationary or moved very slowly for two days about 150 miles to the west of central Luzon, at the same time inclining again to the N. Finally, on the 21st, it recurved NE. and ENE., passing through the Balintang Channel on the 22d and entering again in the Pacific in the afternoon or evening of the same day.

## DETAILS OF THE WEATHER IN THE UNITED STATES.

### GENERAL CONDITIONS.

ALFRED J. HENRY.

The month, as a whole, presented no sharp extremes or pronounced departures from normal conditions; it was dry over the greater part of the area, especially in Pacific Coast States and also east of the Mississippi and south of the Ohio (see the inset on Chart IV). Due to the eastward movement of several shallow barometric depressions along the northern border, the temperature was above the average mainly in northern States (see Chart III). The usual details follow.

### CYCLONES AND ANTICYCLONES.

By W. P. DAY.

There was an increase in the number of cyclones and anticyclones charted as compared with the preceding month. This is a normal tendency due to increased temperature gradients between polar and equatorial zones and a corresponding increase in the rapidity of air interchange between these regions. However, the low-pressure areas or cyclones with one or two exceptions were not important as storms, and the high-pressure areas, being largely of the north Pacific type, did not cause any important depressions of the temperature.

### FREE-AIR SUMMARY.

By L. T. SAMUELS, Meteorologist.

A noticeable feature of the mean free-air temperatures for the month was the general continuation of like departures both in sign and magnitude from the surface to the highest altitudes reached by the kites. (See Table 1.) Ordinarily the departures become appreciably smaller with increasing altitude, with a tendency to approach zero. Climatological Chart III shows a striking contrast between large positive departures in the northern part of the country and negative departures in the South. Free-air departures are found to conform to these to a large extent.

Relative humidities averaged very close to their normals for all stations and levels.

Vapor-pressure departures followed, in general, those for temperature except at Ellendale, where a very con-

siderable deficiency for the month was found. With the large positive temperature departures found at this station there would ordinarily be expected a considerable excess in the mean vapor pressures. However, this was not the case, there being only small positive departures from the surface to 1,500 m., above which they were negative. In this connection it is interesting to note that only 0.23 of an inch of precipitation occurred during the month, the smallest amount for November since the establishment of the station.

In Table 2 are shown the resultant wind directions and velocities for the month. Generally good agreement is found between the resultant direction as compared with the normals and the corresponding monthly temperature departure, that is, a positive temperature departure is usually accompanied by a more southerly or less northerly wind component than normally, and vice versa.

Resultant winds for the month based on afternoon pilot-balloon observations made at 10 regular Weather Bureau stations, in addition to six regular aerological stations, make possible the determination of the resultant atmospheric drift over the country as a whole. However, as yet, large sections, such as the Pacific coast and the plateau region, are inadequately represented by single stations, the Army and Navy stations not taking regular observations at this time of the year, and only comparatively low altitudes are obtained. At 1,000 m. above the surface these showed a westerly drift east of the Rocky Mountains except at Key West, south of west over New England and the Southern Plains States, north of west over the Missouri Valley, Denver, and Middle Atlantic States, due west over the Lake region and Memphis, east of north over San Francisco, north of east over Key West, and due east over San Juan and Curacao, Danish West Indies (the latter station being maintained through cooperation with the Dutch Government and located in latitude  $12^{\circ}$  N., longitude  $69^{\circ}$  W.). At 2,000 m. the direction was north of west at all mainland stations except Burlington, where it remained S.  $57^{\circ}$  W. and due east at San Juan and south of east at Curacao. At 4,000 m. this continued, with the exception of San Francisco, which became east of north, San Juan at this level also being slightly north of west, while Curacao remained south of east. Practically no change was found at 5,000 m. except at Curacao, which became